

Tissue engineered cartilage from autologous, dermis-isolated, adult, stem (DIAS) cells

Grant Award Details

Tissue engineered cartilage from autologous, dermis-isolated, adult, stem (DIAS) cells

Grant Type: Early Translational III

Grant Number: TR3-05709

Project Objective: This project is developing skin-derived stem cells for engineered cartilage. They have identified a cell population they refer to as dermis isolated adult stem (DIAS) cells. They are using these cells to develop autologous skin cell-derived articular cartilage to use for cartilage injury repair. The objective of this DCF project is to first demonstrate a comparable cell population from human skin and then to show safety and efficacy of DIAS cell-engineered cartilage in vivo in small and large animal models.

Investigator:

Name:	Kyriacos Athanasiou
Institution:	University of California, Davis
Type:	PI

Disease Focus: Bone or Cartilage Disease

Human Stem Cell Use: Adult Stem Cell

Award Value: \$1,735,703

Status: Closed

Progress Reports

Reporting Period: Year 1

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Reporting Period: Year 2

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Reporting Period: Year 3

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Reporting Period: NCE (Year 4)

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Grant Application Details

Application Title: Tissue engineered cartilage from autologous, dermis-isolated, adult, stem (DIAS) cells

Public Abstract: This study addresses the cartilage defects resulting from injuries or from wear-and-tear that can eventually degenerate to osteoarthritis. This is a significant problem that impacts millions and costs in excess of \$65B per annum in the US alone. Addressing this indication successfully holds potential for halting the progression of cartilage damage before it destroys the entire joint. We have shown that articular cartilage can be engineered with properties on par with native tissues using chondrocytes. Also, skin derived stem cells can be used to engineer new cartilage with significant mechanical integrity. Combining these findings, the new cellular therapy that this proposal seeks to develop is an autologous skin cell-derived combination product for articular cartilage repair. Three aims are proposed to advance this autologous, adult stem cell-based method: First, protocols shown to be efficacious in cartilage tissue engineering will be applied to skin-derived stem cells and show safety in the mouse model. Then, using a preclinical model, the desired biological response, toxicology, and durability will be verified. Finally, short-term safety and efficacy of cartilage repair will be examined in a different preclinical model. Successful completion of this DCF project will allow the start of preclinical studies in the sheep that demonstrate long-term safety and efficacy, as specified by the FDA.

Statement of Benefit to California: Arthritis is the leading cause of disability in the US, affecting over 46 million Americans. Of these, over 5 million Californians are affected by this debilitating disease, with roughly 3 million that are women and over 2 million that are men. Additionally, Californian youth is also included in the estimated 30 million children who participate in organized sports activities, whose yearly costs for injuries have been projected to be \$1.8 billion. For young patients with knee injuries, 75% exhibit superficial (grade I-II) and 25% exhibit deep (grade III-IV) cartilage lesions. Young patients not only need to retain mobility for many years in life but also new, tissue-sparing techniques. This proposal seeks to develop an autologous, adult stem cell-based therapy that addresses grade II-IV cartilage lesions. The source of these cells will be the skin, using minimally invasive procedures. The development of such a therapy would expand the clinical options available to Californians. The assembled team of academics, orthopaedic surgeons, and veterinary surgeons are based in the [REDACTED]. The refinement of this research will not only benefit [REDACTED] in terms of increasing competitiveness for NIH funding, but it will also allow for Californian companies to license the technology and therefore benefit economically.

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